Chapter 8

Question 8.2

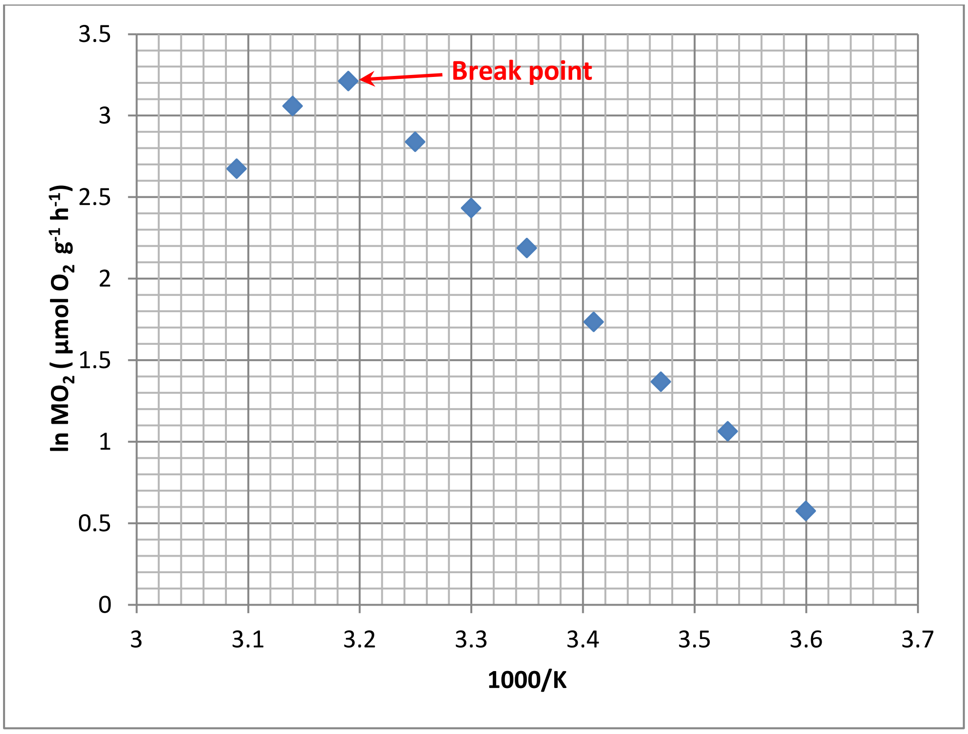
$Q_{10} = \left(\frac{5.5}{4.2}\right)^{\frac{10}{(20-15)}}$ = 1.7 and is within the normal range for a fish.

At 5 ºC, $\dot{M}_{O_2}$ would be that at 15 ºC (4.2 µmol g^{-1} h^{-1})/1.7 (Q_{10}) = **2.47 µmol g^{-1} h^{-1}**

At 30 ºC, $\dot{M}_{O_2}$ would be that at 20 ºC (5.5µmol g^{-1} h^{-1}) x 1.7 (Q_{10}) = **9.35 µmol g^{-1} h^{-1}**

Question 8.3

Convert ºC to K (0 ºC = 273 K) and then calculate 1000/K. Convert $\dot{M}_{O_2}$ to ln $\dot{M}_{O_2}$ and then plot ln $\dot{M}_{O_2}$ against 1000/K:



The Q_{10} between 5 and 40 ºC, where the break point occurs, is $\left(\frac{24.8}{1.78}\right)^{\frac{10}{(40-5)}}$
= $13.9^{0.286}$ = **2.12**

Question 8.5

The area of the sphere with a radius of 1 m and with rat B in the centre is 4π × 1m × 1 m = 4 × 3.14 m^2. If the surface area of rat A receiving the radiation from rat B is S, the fraction of the total radiation emitted by rat B (0.457 W) reaching rat A, at a distance of 1 m, is 0.457 W × S/surface area of the sphere with radius 1 m
= 0.457 W × S/(4 × 3.14 m^2)
= S × 0.03638 W m^{-2}.

Rat A also receives radiation from the Sun, which is S × (50% of 1.37 kW m^{-2}) = S × 685 W m^{-2}.

Therefore, the ratio between radiation received from the Sun and radiation received from rat B is S × 685 W m^{-2} / S × 0.03638 W m^{-2} = **18,829**